



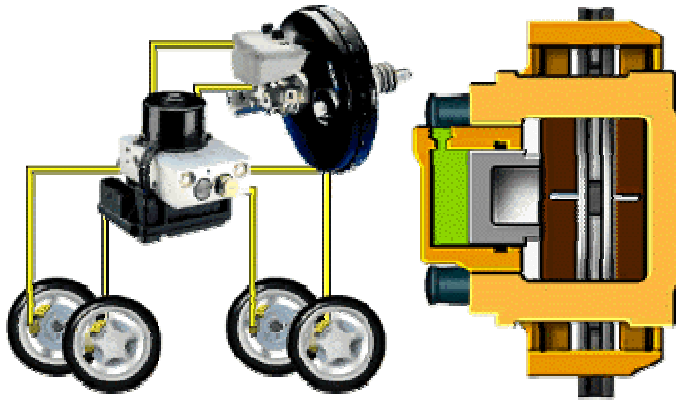
FACT SHEET

Module 9

Questions and Answers about ABS

QUESTIONS AND ANSWERS ABOUT ABS

What is ABS? ABS is an acronym for anti-lock braking system, one of the most significant safety advances in automotive engineering in recent decades. First developed and patented in 1936, ABS is actually derived from the German term "antiblockiersystem."



Anti-lock brakes are designed to prevent skidding and help drivers maintain steering control during an emergency stopping situation. In cars equipped with conventional brakes, the driver pumps the brakes, whereas in cars equipped with four-wheel ABS, the driver keeps a firm foot on the brake, allowing the system to rapidly and automatically pump the brakes. Because the wheels don't lock, drivers have the ability to steer around hazards if they are unable to stop in time.

What does ABS do for me? ABS can improve vehicle stability, steerability and stopping capability.

When the braking force created by the driver is greater than the tire can handle, the wheel can lock up. Locked wheels can create vehicle instability problems and prevent steering around obstacles in the road. Stopping distance on many slippery surfaces will also increase with locked wheels. Four-wheel ABS prevents wheel lock-up in situations in which the wheels might normally lock, such as on slippery roads.

ABS can also prevent tire damage. Locked wheels on dry asphalt or concrete can quickly create flat spots on tires, which can cause an annoying vibration while driving. The big advantage, however, is the maintenance of the tire -- a significant factor in effective stopping.

Most anti-lock brake systems will indicate their operation by pulsations in the brake pedal and a noticeable sound. If the driver notices these pulsations and sounds, it is an indication that the roads are slippery. Speed and following distance should therefore be adjusted.

To reap the maximum safety benefits of ABS, drivers must know how to use the system correctly.

How does it work? In vehicles equipped with conventional brakes, drivers often apply their brakes to the point at which the wheels lock up. This results in a loss of steering control and less-than-maximum braking effect.

When a driver operating a four-wheel ABS-equipped vehicle steps firmly on the brake pedal, the system automatically modulates the brake pressure at all four wheels, adjusting pressure to each wheel independently to prevent wheel lock-up.

With ABS, stopping distances decrease in many cases and the driver can maintain steering control of the vehicle. Importantly, four-wheel ABS allows the driver continuing control to help steer around hazards if a complete stop cannot be accomplished in time.

How do you know your ABS is working? Most anti-lock brake systems let you know when you have activated your ABS. The driver usually notices a mechanical sound and can feel some pulsation or increased resistance in the brake pedal. This means traction limits have been reached on the road being traveled. It is important not to take your foot off the brake pedal when you hear noise or feel vibrations, but instead continue to apply firm pressure.

What is the difference between rear-wheel anti-locks (RWAL) and four-wheel anti-locks? Rear-wheel anti-lock brakes (RWAL), found exclusively on light trucks, vans and sports utility vehicles, are designed to maintain directional stability. Four-wheel anti-lock brakes, usually found on passenger cars and some light trucks, are designed to maintain steerability in emergency stopping situations.

Because the braking system in a four-wheel anti-lock vehicle modulates the braking pressure and thereby prevents wheel lock on all four wheels, the driver maintains control over steering. Drivers of RWAL vehicles, on the other hand, control the braking and thus the lock prevention capabilities of the front wheels. If the driver steps too firmly on the brake pedal, the front wheels can lock and prevent steering -- the same that would happen with conventional brakes. But with RWAL ABS, the vehicle continues to move in a straight line. With just enough pressure applied, the driver with RWAL can maintain steering control.

Drivers of four-wheel ABS cars should step firmly on the brake in an emergency stopping situation and keep their foot on the pedal. Drivers of RWAL vehicles should step firmly with care, and if they feel the wheels begin to lock, they should withhold some pressure.

Do cars with ABS stop more quickly than cars without it? Not always. Although the stopping distance with ABS is shorter under most road conditions, drivers should always keep a safe distance behind the vehicle in front of them and maintain a speed consistent with the road conditions. While a vehicle with ABS maintains its steering capability in a sudden stop, it may not turn as quickly on a slippery road as it would on dry pavement.

Can you lose steerability? The tire can deliver a fixed amount of traction for the road conditions. This traction is divided between steering and braking. A driver can continue to steer a vehicle using maximum ABS braking but not as sharply as he or she could without braking.

Can ABS stop all car skids? While ABS cannot prevent all skids, it does prevent the wheels from locking in typical panic situations. ABS cannot, however, change the laws of physics. A combination of excessive speed, sharp turns and slamming brakes can still throw an ABS-equipped vehicle into a sideways skid.

In what circumstances might conventional brakes have an advantage over ABS? There are some conditions where stopping distance may be shorter without ABS. For example, in cases where the road is covered with loose gravel or freshly fallen snow, the locked wheels of a non-ABS car build up a wedge of gravel or snow, which can contribute to a shortening of the braking distance.

If I live in the Snow Belt, how can I benefit from ABS? Even in fresh snow conditions, you gain the advantages of better steerability and stability with four-wheel ABS than with a conventional system that could result in locked wheels.

In exchange for an increased stopping distance, the vehicle will remain stable and maintain full steering since the wheels won't be locked. The gain in stability makes a potential increase in stopping distances an acceptable

compromise for most drivers. All in all, these benefits outweigh the rare instances where the ABS system increases distances over non-ABS equipped vehicles.

Does ABS work on ice? Yes. The system's computer monitors the speed of each of the vehicle's wheels, compares them and adjusts brake pressure to each wheel to ensure the car stops in the shortest distance possible for most road surfaces.

Will pumping the brakes on ABS-equipped vehicles improve braking performance? NO! When in use, the ABS automatically varies the brake pressure much better than pumping can. Do not pump the brakes; apply force firmly.

What if the ABS fails? Anti-lock brake systems are designed to be fail-safe. Nevertheless, they are equipped with a diagnostic feature that automatically activates and tests the major components each time the car is started and monitors them throughout the journey.

In the rare event of a failure, the ABS would be deactivated by its own safety circuit. A warning light goes on indicating to the driver that the vehicle is now in conventional base-brake mode.

Why invest in a system you may use only a few times? When you consider that ABS can protect your automotive investment, your health and safety, passengers and other motorists, ABS is a good investment.

Most people agree the investment in ABS proves its worth if it prevents just one accident. Maybe that's why nearly nine out of 10 first-time ABS buyers in Europe are repeat buyers.

How do I know if the vehicle I'm driving has ABS?

Most newer car models offer ABS as either standard or optional equipment. There are different ways to find out whether your car has an anti-lock brake system:

If you buy or lease a new car, ask your dealer. Check your instrument panel for an ABS indicator light after you turn on the ignition. Read your owner's manual. If renting a vehicle, check with the rental car company when picking it up.

To determine if your vehicle has rear-wheel anti-lock brakes or four-wheel ABS:

- Read the owner's manual.
- Ask your dealer.
- If you buy or lease a new vehicle, check the window sticker equipment listing.
- A qualified mechanic can tell you by checking under the hood and reviewing the brake hose routings and ABS package.

What is the difference between an anti-lock brake system and other technology such as traction control or the new intelligent stability and handling systems? Comparative Analysis of Automotive Braking Safety Technologies

Compare/Contrast Automotive Braking Safety Technologies

There seems to be a new report on automotive safety everyday. New automotive technologies help drivers maintain control of their vehicles. The following chart shows the safety features found on four-wheel anti-lock brake systems (ABS), traction control and intelligent stability and handling systems.

	4 Wheel ABS	Traction Control	Intelligent Stability and Handling Systems
Prevents wheel lock-up under many road conditions	X		X
Allows driver to maintain control when brakes are fully applied	X		X
Sensors detect impending wheel lock-up	X		X
Pumps the brakes like a driver would, only much faster and more effectively	X		X
Engages when the driver stomps on the brake pedal	X		X
Prevents unwanted wheel spin in low traction situations		X	X
Adjusts vehicle acceleration when driving in low-traction situations, such as rain or snow		X	X
Helps drivers accelerate safely		X	X
Detects a vehicle's position in relation to steering input with use of sensors			X
Monitors and compares a vehicle's movement with the direction a driver is steering			X
Automatically brakes specific wheels, allowing a driver to maintain steering control during a skid			X

Source: ABS Education, Continental Teves